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(33) JP

(71) Applicant(s)

Toyokasei Company Limited

(Incorporated in Japan)

238-1 Fujii, Okayama-shi, Okayama-ken, Japan

(72) Inventor(s)

Hiromichi Kano

(74) Agent and/or Address for Service

Boult Wade Tennant

27 Furnival Street, LONDON, EC4A 1PQ,
United Kingdom

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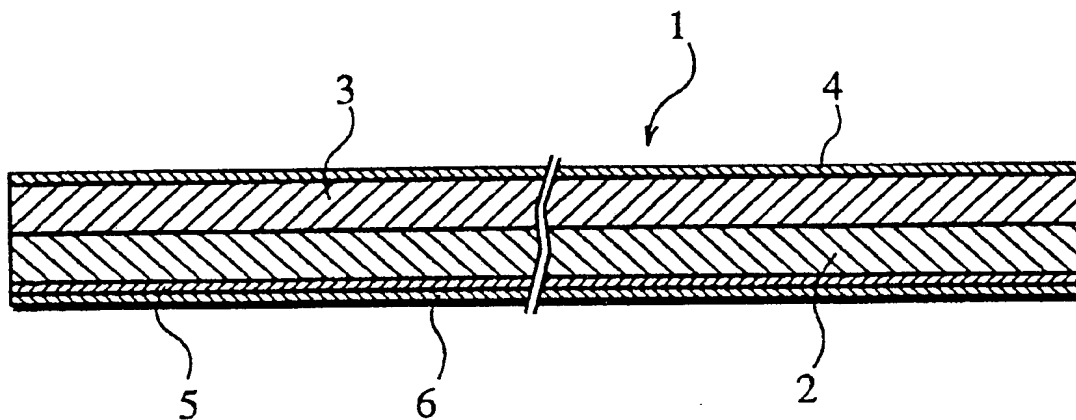
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(54) Decorative sheet for exterior wall surface

(57) A decorative sheet for an exterior wall surface comprises a flexible nonwoven fabric (2) which is permeable to air and moisture, and a coating layer (3) formed on a front surface of the nonwoven fabric, the coating layer being also flexible and permeable to air and moisture after drying. The coating layer may be releasably covered by a stretchable plastic film (4). Further, the nonwoven fabric may have a rear surface formed with an air- and moisture-permeable adhesive layer (5) which is covered by a releasable paper (6).

Fig.1



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Fig.1

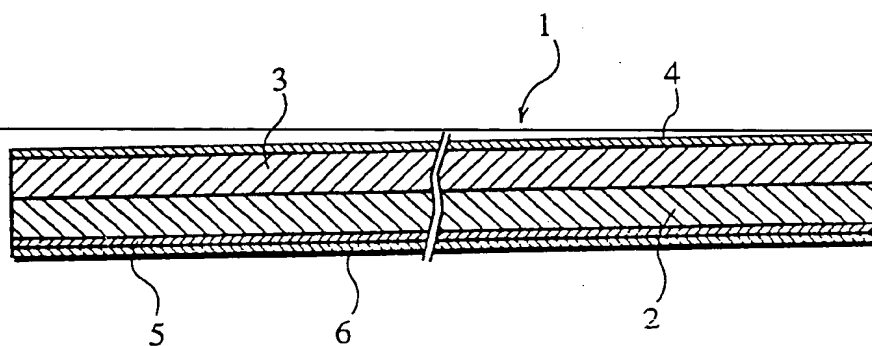


Fig.2

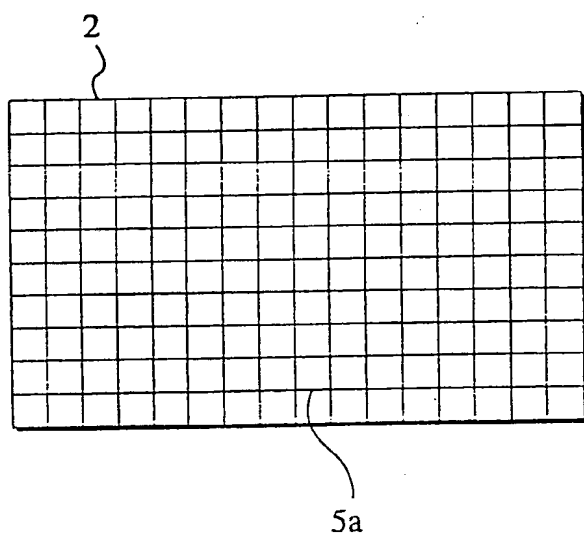


Fig.3

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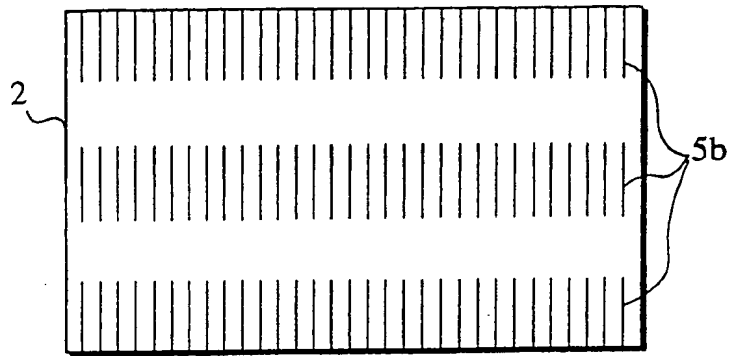


Fig.4

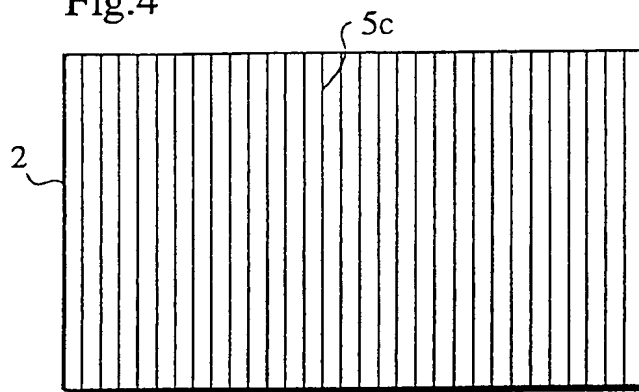
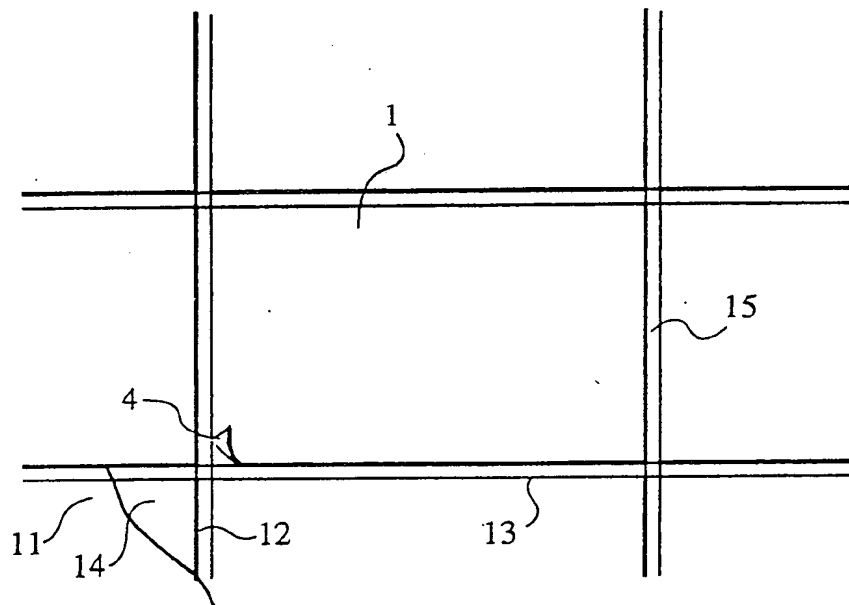


Fig.5



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Fig.6

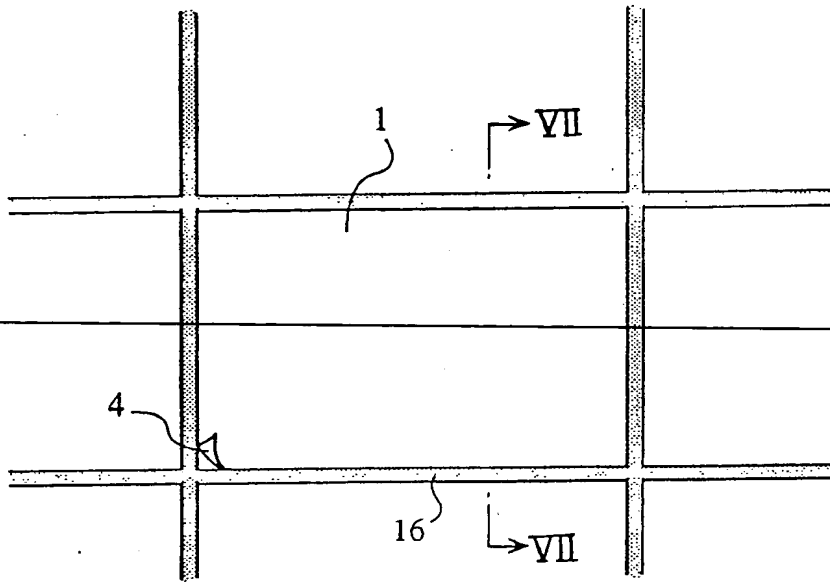
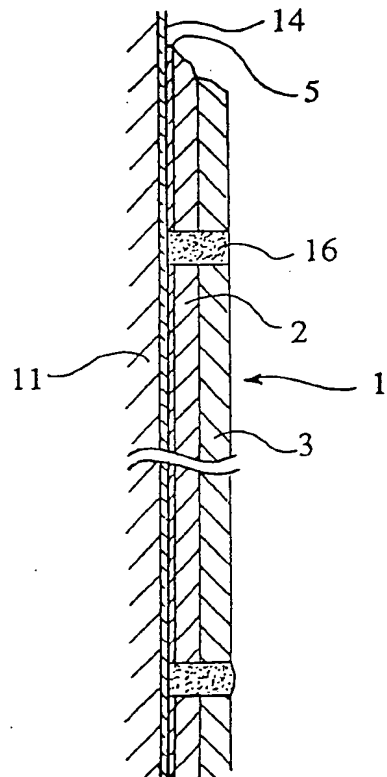


Fig.7



DECORATIVE SHEET FOR EXTERIOR WALL SURFACE

The present invention relates to a decorative sheet which is affixed to an exterior wall surface for decorative and protective purposes.

Conventionally, an exterior wall surface of a building is most typically treated by directly applying a painting or coating material to the surface by means of a spray gun. However, the spray gun method is likely to result in poor appearance due to unevenness of the coating thickness and/or color in addition to giving rise to a pollution problem. Further, the spray gun method is also disadvantageous in that the coating work is greatly influenced by the weather.

To solve the problems of the spray gun method, it has been proposed to use decorative sheets for covering an exterior wall surface of a building. Various kinds of exterior decorative sheets are known, but they are equally impermeable to air and moisture. Indeed, due to the outside use (particularly in consideration of rain), the designing emphasis is placed mainly on durability, and no or little attention has been ever paid to the necessity of imparting an air- and moisture-permeability to the exterior decorative sheet, as opposed to a decorative cloth for an interior wall surface.

When such a decorative sheet is affixed to an exterior wall surface, there is a tendency of locally trapping air between the sheet and the wall surface due to its inability of allowing air passage. As a result, the sheet will be locally bulged in addition to being likely to come off the wall surface. This

problem becomes particularly remarkable when the exterior wall surface has projections and depressions.

Further, the prior decorative sheet is known to be relatively hard and heavy. As a result, it is rather difficult to adapt the sheet to corner or bent or undulated portions of an exterior wall surface, and the sheet is likely to displace gravitationally on a vertical wall surface.

It is, therefore, an object of the present invention to provide a decorative sheet which can be conveniently affixed to an exterior wall surface, even corner or bent or undulated portions thereof, without trapping air between the sheet and the wall surface, thereby providing an improved appearance while also preventing unexpected removal from the wall surface.

According to the present invention, there is provided a decorative sheet for a wall surface comprising a flexible nonwoven fabric which is permeable to air and moisture, and a coating layer formed on a front surface of the nonwoven fabric, the coating layer being also flexible and permeable to air and moisture after drying.

The nonwoven fabric may be preferably made of at least one material selected from the group consisting of polyester fibers, polypropylene fibers, polyethylene fibers, nylon fibers, acrylic fibers, rayon fibers, acetate fibers and vinylon fibers.

On the other hand, the coating layer may be advantageously made of a coating material which is prepared by mixing at least one matrix with at least one additive. The matrix may be preferably selected from the group consisting of acrylic resin, copolymerized acrylic rubber, copolymerized butadiene rubber,

vinyl resin, urethane resin, silicone resin and fluoro carbon resin, whereas the additive may be preferably selected from the group consisting of natural stone powder, fine particles of natural stone, artificially colored particles of natural stone, fine particles of foaming agent, ceramic powder, glass powder, fine plastic particles and pigment.

In one embodiment of the present invention, the coating layer is releasably covered by a stretchable plastic film, so that the coating layer is prevented from being soiled or stained at the time of affixing the decorative sheet. Further, the nonwoven fabric has a rear surface formed with a uniform adhesive layer which is permeable to air and moisture, and the adhesive layer is covered by a releasable paper layer.

In another embodiment, the nonwoven fabric has a rear surface which may be formed with a mesh adhesive pattern. Alternatively, the rear surface of the nonwoven fabric is formed with a comb-like adhesive pattern or a stripe adhesive pattern.

Other objects, features and advantages of the present invention will be clearly understood from the following description of a preferred embodiment given with reference to the accompanying drawings, in which:

Fig. 1 is a sectional view showing a decorative sheet according to an embodiment of the present invention;

Fig. 2 is a bottom view showing a mesh adhesive pattern used for affixing the decorative sheet;

Fig. 3 is a bottom view showing a comb-like adhesive pattern used for affixing the decorative sheet;

Fig. 4 is a bottom view showing a stripe adhesive pattern

used for affixing the decorative sheet;

Figs. 5 and 6 are front views showing successive steps of affixing the decorative sheet to a wall surface; and

Fig. 7 is a sectional view taken along lines VII-VII in Fig.

5 6.

Referring first to Fig. 1 of the accompanying drawings, a decorative sheet 1 according to a preferred embodiment of the present invention comprises a nonwoven fabric 2 having a front surface covered by a coating layer 3 which is in turn covered by a
10 releasable (peelable) plastic film 4. The nonwoven fabric 2 has a rear surface covered by an adhesive layer 5 which is in turn covered by a releasable (peelable) paper layer 6. The decorative sheet 1 may be manufactured and cut in a predetermined shape at the factory.

15 The nonwoven fabric 2 is of the needled type and has a number of pores (not shown) similarly to a woven fabric. Thus, the nonwoven fabric 2 is not only flexible but also permeable to air and moisture. The nonwoven fabric 2 may be made of at least one material selected from the group consisting of polyester fibers,
20 polypropylene fibers, polyethylene fibers, nylon fibers, acrylic fibers, rayon fibers, acetate fibers and vinylon fibers.

The thickness of the nonwoven fabric 2 is preferably in the range of 0.5-3.0mm. If the thickness is less than 0.5mm, the nonwoven fabric 1 not only lacks durability in itself but also
25 fails to impart a sufficient resistance against crack formation to the wall surface to which the decorative sheet 1 is applied. If the thickness is larger than 3.0mm, on the other hand, the nonwoven fabric 1 becomes too costly and fails to have an enough

flexibility required for facilitating affixture to the wall surface at corner portions thereof.

The coating layer 3 need also be flexible and permeable to air and moisture after drying. A suitable coating material for the coating layer 3 may be prepared by mixing at least one matrix selected from acrylic resin, copolymerized acrylic rubber, copolymerized butadiene rubber, vinyl resin, urethane resin, silicone resin and fluoro carbon resin with at least one additive selected from natural stone powder, fine particles of natural stone, artificially colored particles of natural stone, fine particles of foaming agent, ceramic powder, glass powder, fine plastic particles and pigment, and the selection may be made depending on the intended or desired surface design. It should be appreciated that the coating layer 3 is rendered permeable to air and moisture by inclusion of the above-mentioned additive.

The formation of the coating layer 3 may be performed at the factory by applying a suitable coating material to the front surface of the nonwoven fabric 2 by using an automatic spray gun or a painting robot, and the coating material thus applied is dried for curing under a controlled temperature and ventilation condition. The thickness, after drying, of the coating layer 3 may be preferably in the range of 0.5-3.0mm. A thickness less than 0.5mm results in poor durability of the coating layer 3. On the other hand, a thickness larger than 3.0mm leads to unacceptable prolongation of the coating application time.

The plastic film 4 is stretchable and has a thickness of not more than 0.3mm. Suitable materials for the film 4 include polyvinyl and polyethylene for example. The film 4 may be

peelably affixed to the coating layer 3 by a suitable adhesive.

5 The adhesive layer 5, which may be not more than 0.5mm in thickness, is a uniform layer which may be made of a contact adhesive (pressure-sensitive adhesive) such as acrylic adhesive or butadiene-family adhesive. Since the adhesive matrix material for the layer 5 itself is not permeable to air and moisture, the uniform adhesive layer 5 may be rendered air- and moisture-permeable by including at least one of fiber fragments and pigment in the adhesive matrix material.

10 The uniform adhesive layer 5 may be replaced by a pattern of adhesive, as shown in Figs. 2-4. Specifically, the uniform adhesive layer 4 may be replaced by a mesh adhesive pattern 5a (Fig. 2), or a comb-like adhesive pattern 5b (Fig. 3), or a stripe adhesive pattern 5c (Fig. 4). Obviously, the use of such
15 an adhesive pattern is advantageous in that permeability to air and moisture is obtained even if the adhesive matrix material itself is not air- and moisture-permeable.

20 The decorative sheet 1 may be affixed to an exterior wall surface together with other similarly configured decorative sheets. Figs. 5 to 7 show how the decorative sheets are affixed.

 In the illustrated example, each of the decorative sheets is rectangular with a size of 600mm × 400mm.

25 First, as shown in Fig. 5, vertical partition lines 12 are marked on the exterior wall surface 11 at a constant interval of 610mm. Similarly, horizontal partition lines 13 are formed at constant interval of 410mm.

 Then, a contact adhesive 14 is applied all over the wall surface 11, and each of the decorative sheets 1 is affixed to a

corresponding portion, defined by the respective partition lines 12, 13, of the wall surface 11, as also shown in Fig. 5. The decorative sheet thus affixed is uniformly pressed against the wall surface 11 by a stretching roller (not shown).

5 The contact adhesive 14 need be made permeable to air and moisture by the inclusion of a suitable additive, similarly to the adhesive layer 5 for the decorative sheet 1 (see Fig. 1). Otherwise, the contact adhesive need be applied in a mesh pattern (like Fig. 2) or a comb-like pattern (like Fig. 3) or a stripe
10 pattern (like Fig. 4). Further, the contact adhesive 14 need be transparent or semitransparent for enabling visual recognition of the respective partition lines 12, 13.

 Then, as shown in Fig. 6, a suitably colored sealant 16 is loaded in the clearances 15 (Fig. 5) between the respective
15 decorative sheets 1. In this step, the plastic film 4 is still held attached to the coating layer 3 (Fig. 1) so that the coating layer will not be soiled or stained by the sealant 16. It should be appreciated that the wall surface 11 may be made to have an appearance of natural stone or rock by suitably selecting the
20 colors of the coating layer 3 and the sealant 16.

 Finally, the plastic film 4 is peeled off the coating layer 3 prior to curing of the sealant 16, as shown in Fig. 7. The surface decorating treatment will be complete when the sealant 16 is fully cured.

25 The decorative sheet 1 according to the illustrated embodiment is permeable to air and moisture as a whole. Thus, it is possible to prevent air from being locally trapped between the sheet and a wall surface. As a result, the decorative sheet 1

provides an improved uniform appearance while also preventing unexpected removal from the wall surface.

Further, the flexibility of the decorative sheet 1 facilitates an affixing operation even at corner portions of a wall surface or at bent or undulated surface portions. Moreover, the decorative sheet 1 can be easily cut to have any size and shape in addition to providing ready adaptation to edges of a wall surface.

The present invention being thus described, it is obvious to those skilled in the art that the same may be varied in many ways.

For instance, the adhesive layer 5 may be completely omitted, and a suitable adhesive may be applied one or both of the rear surface of the nonwoven fabric 2 and the wall surface at the site of affixing the decorative sheet 1 to the wall surface. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such variations as would be obvious to those skilled in the art are intended to be included within the scope of the following claims.

C L A I M S

1. A decorative sheet for an exterior wall surface comprising a flexible nonwoven fabric which is permeable to air and moisture, and a coating layer formed on a front surface of the nonwoven fabric, the coating layer being also flexible and permeable to
5 air and moisture after drying.

2. The decorative sheet according to claim 1, wherein the nonwoven fabric is made of at least one material selected from the group consisting of polyester fibers, polypropylene fibers, polyethylene fibers, nylon fibers, acrylic fibers, rayon fibers, acetate fibers and vinylon fibers.
5

3. The decorative sheet according to claim 1 or 2, wherein the coating layer is made of a coating material which is prepared by mixing at least one matrix with at least one additive, said at least one matrix being selected from the group consisting of acrylic resin, copolymerized acrylic rubber, copolymerized butadiene rubber, vinyl resin, urethane resin, silicone resin and fluoro carbon resin, said at least one additive being selected from the group consisting of natural stone powder, fine particles of natural stone, artificially colored particles of natural stone, fine particles of foaming agent, ceramic powder, glass powder, fine plastic particles and pigment.
10

4. The decorative sheet according to any one of claims 1 to 3, wherein the coating layer is releasably covered by a plastic film.

5. The decorative sheet according to claim 4, wherein the plastic film is stretchable.

6. The decorative sheet according to any one of claims 1 to 5, wherein the nonwoven fabric has a rear surface formed with a uniform adhesive layer which is permeable to air and moisture, the adhesive layer being covered by a releasable paper layer.

7. The decorative sheet according to any one of claims 1 to 5, wherein the nonwoven fabric has a rear surface formed with a mesh adhesive pattern.

8. The decorative sheet according to any one of claims 1 to 5, wherein the nonwoven fabric has a rear surface formed with a comb-like adhesive pattern.

9. The decorative sheet according to any one of claims 1 to 5, wherein the nonwoven fabric has a rear surface formed with a stripe adhesive pattern.

10. A decorative sheet as claimed in claim 1 substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9319989.1
Relevant Technical Fields (i) UK Cl (Ed.M) B2E (EM) E1D (DCF) (DF106) (DF119) (DF151) (ii) Int Cl (Ed.5) D06N 3/00	Search Examiner V V BAILEY-WOOD
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii)	Date of completion of Search 24 DECEMBER 1993 Documents considered relevant following a search in respect of Claims :- 1-10

Categories of documents

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Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.	E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A: Document indicating technological background and/or state of the art.	&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
X	GB A 2114585 (PORVAIR) - see Claim 7	1-3
Y	GB A 2108867 (REED) - see Claim 1	1-9
Y	GB A 1458444 (PICKHARDT) - see page 1 lines 47-65	1-9
Y	GB A 1239430 (BREVETEAM) - see figures	6-9
Y	GB A 1075276 (ENGEN) - whole document	X: Claims 1-3 Y: Claims 4-10
X	EP A2 0151963 (UNITAKA)	1-3

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